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ABSTRACT

The recent frenzy over education--that is, children and schools--has obscured an adult learning crisis that will really put this nation's economy at risk between now and the beginning of the next century. The postindustrial economy demands a new kind of learning enterprise, focused on adults rather than children, on learning rather than education, on technology rather than institutions, and on private competition rather than public administration. Economic security in the postindustrial economy depends less on expertise and more on "flexpertise"--the ability continually to adapt individual knowledge and skill. Virtually the entire adult population needs retraining and new learning to be economically productive. Reforms of elementary and secondary education, however justified, will have little impact on these urgent adult learning needs before the next century. "More education" will not solve the human capital crisis. The emergence of a knowledge-based economy requires a new synthesis of the functions of training, education, and other forms of communication and learning under the single umbrella of the "learning enterprise." The major barrier to reforming the current policy framework and creating the kind of learning enterprise needed by a new economy is an appalling lack of timely and accurate information about the entire system of adult learning in the United States. This information must be gathered, education must be made learning centered rather than degree centered, and new technology must be used, in order to meet the economy's growing need for flexible human capital. (KC)

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THE LEARNING ENTERPRISE

Adult Learning Human Capital and Economic Development

Lewis J. Perelman

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Adult Learning Human Capital and Economic Development

Lewis J. Perelman

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Foreword

A VIGOROUS NATIONAL ECONOMY depends on sound investments by all levels of government and the private sector. States play a key role in influencing these investment decisions through their tax and regulatory policies, grant and loan programs, budget allocations, direct services and management of federal programs.

Human resource investments are becoming more and more critical to the entire process of economic development in a new postindustrial era. As part of its broad mission to anticipate, define, and analyze emerging issues of importance to the states, the Council of State Planning Agencies has begun to explore the potential of the learning industry sector of the economy. This effort will lead to a reappraisal of the state government role in this area of human resource investment to improve its contribution to economic development.

In particular, CSPA wants to stimulate policymakers to make the overall U.S. system of adult training, education, and learning more responsive to the changing needs of both employers and individual workers. The publication of *The Learning Enterprise* is an important step toward this objective.

While CSPA does not necessarily endorse all the author's views we believe that Dr. Perelman's work is thought provoking and timely. Challenging conventional approaches to adult learning, work, and development, he makes a persuasive case for rethinking training policy by states and other actors. For its part, CSPA is seeking to expand and refine the analysis that Lew Perelman has begun in this exploratory study. We appreciate Dr. Perelman's effort and thank him for his interest and support in a vital issue for the states.

James M. Souby
Executive Director
CSPA

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Of course, responsibility for the opinions and facts presented here is exclusively the author's.

Lewis J. Perelman

About the Author

DR. LEWIS J. PERELMAN is a consultant on policy and strategic management. Following undergraduate and graduate study in applied mathematics at City College of New York, the Goddard Institute, and Harvard, he earned his doctorate in Administration, Planning, and Social Policy at the Harvard Graduate School of Education. He has worked as a consultant to several postsecondary education organizations, including the Western Interstate Commission for Higher Education, the Ontario Educational Communications Authority, and the Association of American Colleges. Dr. Perelman also has worked for local (City of New York), state (Colorado), and federal (Department of Energy) government agencies in a variety of policy analysis assignments. He was formerly Director of Business Intelligence at Holiday Inns, Inc., and his clients in his private practice have included the Council of State Planning Agencies, the Edison Electric Institute, the International Business Machines Corp., the President's Commission on the Accident at Three Mile Island, and the Public Service Co. of Colorado. His experience in advanced technology research and development includes over four years on the staffs of the Solar Energy Research Institute and the Jet Propulsion Laboratory, as well as being a visiting scientist at the International Institute for Applied Systems Analysis. Dr. Perelman is the author of *The Global Mind: Beyond the Limits to Growth* (Mason/Charter, 1976), coeditor of *Energy Transitions: Long-Term Perspectives* (Westview Press, 1981), and has produced over 40 other publications concerned with learning, management, and economic development. Dr. Perelman currently resides in Alexandria, Virginia.

Introduction

In public policy and private management, America hungers for new ideas. Of the new ideas that have percolated into the agenda of public debate in recent days, I can think of none more provocative, more innovative, or more important than Lew Perelman's vision of the "learning enterprise." Its central concept is a stirring challenge to conventional wisdom: *Learning* is the key capital-forming *industry* of the postindustrial economy.

This monograph is a refreshing departure from the themes presented by a slew of reports on the state of American education issued during the past year by a variety of national task forces and commissions. Though the author concedes that the education of children is a valid concern, he correctly points out that reforms of elementary and secondary education will have little impact on the immediate human capital crisis that will put this nation at risk for the next 20 to 30 years.

In contrast, Perelman tackles head-on the crucial facts about learning and economic development that many of these other studies have sidestepped or ignored. Because of the population bulge of the baby-boom generation, 80 percent of the people who will comprise the American work force at the beginning of the 21st century are already adults today. Of this current adult population, at least a fifth is classified as functionally illiterate.

Moreover, the turbulent technological and structural changes that characterize the ongoing transition to a postindustrial economy pose the threat of employment dislocation to virtually every adult in the work force—not just to blue-collar workers in aging smokestack industries, but to white-collar office workers, business executives, and even such professionals as lawyers and doctors.

While the United States is doing much to modernize its stock of plant, equipment, and technology, it is doing too little to modernize its human capital. What the nation lacks, but desperately requires, is an integrated approach

to renewing the skill of its adult work force through continual retraining and reeducation.

Perelman presents a unique and creative approach to meeting this urgent need. First, if our chief concern is the competitive strength of the U.S. economy during the next two decades, then Perelman insists we must focus our attention not on the education of children but on the learning of adults. He wants us to look beyond the interests of educational and training institutions to concentrate on the processes of learning and the needs of the learning consumer.

The challenge to our thinking is pervasive. Perelman compels us to reconsider not only our policies, but our stereotypes, our prejudices, even our vocabulary. He tells us, in effect, he is here to talk about learning, not education or training or schooling. *Jobs* is a political concept that differs from work and may not have much to do with an individual's hopes for employment. Development of the community is not the same thing as development of the individual.

Perhaps what most distinguishes this report from other recent studies in this area is Perelman's urgent concern for the costs as well as the benefits of training and education. The edifice of the school—a building with classrooms and teachers—is an inefficient and obsolescent technology, in Perelman's view. To meet the needs of an increasingly knowledge-based economy, we must vastly increase the productivity of the learning process by taking full advantage of the burgeoning power of computers and telecommunications—what Perelman calls "telematic technology."

Perelman's obsession with cost-effectiveness is reflected in this report's central vision of learning as a competitive industry, in stark contrast to the conventional view of education as an institutionalized social service. By cultivating the growth of the learning industry, Perelman believes we could actually reduce the cost and scope of government's role in education and training while meeting the needs for adult learning more effectively.

There is no call here for expanded entitlements or social services. What Perelman wants government to do is highly focused: support basic research and development

and technology transfer, and help meet the critical need for better information about learning markets—in terms of learning needs, demands, technologies, and suppliers. Beyond that, Perelman would like government to rethink its policies and try to get out of the way of the learning enterprise.

I hope this report will be widely read. It should be seriously studied by public and private policymakers: by funding agencies investing resources in training, education, and economic development; by business executives; and by labor leaders. I suspect that people in the many organizations that constitute the learning industry will be especially excited by Perelman's vision of their crucial role in a changing economy. Ultimately, there is a valuable message of hope in these pages for every adult in the nation's work force: the same technology that is transforming work can increase our power to learn and to choose a future.

Perelman's study has been exploratory. His report offers new ideas and raises important questions that demand a substantial investment of resources to analyze as thoroughly as they should be. I hope this report will stimulate the support needed for the Council of State Planning Agencies and other organizations to carry this work forward.

Still, this is a milestone statement in the national debate swirling about work and learning, and about education and the economy. I believe Perelman's concept of the learning enterprise will force a basic change in the terms of this debate. His report is destined to be controversial. But the new ideas it offers are just what America needs today.

Pat Choate
Senior Policy Analyst,
TRW, Inc.

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Executive Summary

THE RECENT FRENZY over education—that is, children and schools—has obscured an *adult learning* crisis that is what really will put this nation's economy at risk between now and the beginning of the next century. The postindustrial economy demands a new kind of learning enterprise, focused on adults rather than children, on learning rather than education, on technology rather than institutions, and on private competition rather than public administration.

Structural transformation of the world economy is leading to a human capital crisis in America as workers are compelled to adapt their knowledge and skill to new technological and organizational requirements. The human costs of the transition to a new economy are already evident. Between 3.5 million and 4 million U.S. workers are structurally unemployed today. Automation and foreign competition have taken the jobs of thousands of industrial workers, and will eliminate 10 million to 15 million manufacturing jobs by the next decade.

But, contrary to popular perception, the economic transformation affects all working Americans, not just blue-collar workers in aging "smokestack" industries. Up to half of today's office jobs will be eliminated by automation. As the baby-boom generation ages, the population of would-be managers is growing twice as fast as the number of management jobs. Only half the doctors in private practice today are working at full capacity, and there will be a surplus of over 100,000 physicians in the 1990s.

The problem is not simply a shortage of jobs but a high rate of obsolescence of working skills and knowledge. For example, the amalgamation and automation of financial services demand a new kind of general practitioner knowledgeable about real estate, savings, investments, cash management, and customer relations. Physicians need to invest less effort in simply memorizing facts and greater effort in learning to use computers to manage

data, diagnose disease, and control costs. American business executives need to learn how to manage people in a participatory culture and how to compete in international markets. Manufacturing work increasingly requires highly creative abilities in computer-based design and production.

Economic security in the postindustrial economy depends less on expertise and more on *flexpertise*—the ability to continually adapt individual knowledge and skill. Unless we in America greatly increase the flexibility of our human capital, the economic transition threatens turbulent, even violent, social upheaval as the economic ambitions of a major portion of the working population become increasingly frustrated.

Learning by the mainstream of work-force adults will be essential to resolve this crisis.

Learning is the key to a more competitive, productive economy. Learning is also the key to preserving the hopes of American workers at all levels for individual economic security and advancement.

But adult learning in the United States today is largely an "invisible system" whose scope and function are widely misunderstood and whose critical importance to economic development is inadequately appreciated.

Virtually the entire adult population needs retraining and new learning to be economically productive. A fifth of the present adult population is functionally illiterate. Most of the rest—including skilled workers, managers, and professionals—have knowledge and skills that technological change is rendering obsolete.

Reforms of elementary and secondary education, however justified, will have little impact on these urgent adult learning needs before the next century. Over three-quarters of the U.S. labor force in the year 2000 will be people who are working-age adults today.

Furthermore, the distinction commonly made between training and education is now obsolete. *Training* is usually defined as instruction intended to convey job-specific competency, while *education* is held to be concerned with broader, more general knowledge and skill.

Today, traditional training programs often fail because of the broad lack of basic skills or functional literacy

among prospective students. One-third of dislocated workers lack a high school diploma, and another third have diplomas but are still functionally illiterate.

On the other hand, much of postsecondary education has failed to meet students' expectations for an economic payoff. The most common single reason adults give for participating in organized learning is to advance in the work world. Yet the irrelevancy of much of the curriculum and process of formal education to real work opportunities has led to a growing mass of overeducated underemployed adults.

Simply "more education" will not solve America's human capital crisis. In this decade, a surplus of a quarter-million college graduates each year will mean that nearly half of those who go to work after graduation will not get the kind of job traditionally held by college graduates. Today's college graduates are twice as likely to be working in a blue-collar or service job as they were in 1970.

Traditional training and educational institutions serve only a minority of adult learning needs today and are too limited and inefficient to supply the burgeoning human capital requirements of tomorrow's economy. While the costs of computers and telecommunications have been falling precipitously, the cost of classroom instruction has been rising much faster than the inflation rate. The institutionalized instruction of the industrial age is inadequate for the postindustrial era.

The emergence of a knowledge-based economy requires a new synthesis of the functions of training, education, and other forms of communication and learning under the single umbrella of the *learning enterprise*.

In the postindustrial age, the learning enterprise will no longer be a parochial social service, but is destined to become the keystone industry of the emerging fourth sector of the economy—the knowledge sector.

By the beginning of the next century, three-quarters of the jobs in the U.S. economy will involve creating and processing knowledge. Knowledge workers will find that continual learning is not only a prerequisite of employment but is a major form of work.

Rapid advances in telematic technology—fusing the power of computers with the reach of telecommunications

—now present the opportunity to create an entrepreneurial, competitive, consumer-directed, high-technology, adult learning industry. This new learning enterprise could actually reduce the burden of government as it profitably serves the growing needs of employers and workers for flexible, adaptable human capital.

But realizing this opportunity will require rethinking some basic policies—both public and private.

Conventional policies concerning education, training, economic development, the relationship between employer and worker, and the distribution of responsibility for investment in human capital are broadly unresponsive to the challenges of the postindustrial age. In general, the relevant policies are aimed more at protecting the holders of existing jobs from the threat of change than at facilitating work transitions.

The underlying theme is not simply that the worker is entitled to employment, but that the current holder of a particularly defined job has a proprietary interest in that position. There is, throughout our entire national system of employment, a voracious hunger for "tenure."

This policy paradigm delays the necessary adaptation of the entire U.S. economy to the forces of global competition and technological change. It largely omits any systematic process for adapting the knowledge and skill of workers at all levels to changing needs and opportunities.

The major barrier to reforming this obsolete policy framework, and to creating the kind of learning enterprise needed by a new economy, is an appalling lack of timely and accurate information about the entire system of adult learning in the United States. We need more information about:

- the demands for adult learning by both individuals and employers;
- the needs for learning in terms of changing occupational requirements and opportunities;
- the state of the art and projected trends in learning technologies; and
- the shape of the market, in terms of the suppliers of learning products and services.

Not only are there deficits of information in all these categories, but there is a total lack of integration of the information that does exist to provide a comprehensive map—the proverbial "big picture"—of the learning enterprise as an industry.

This lack of information handicaps the suppliers of the learning enterprise, who need to know more about the demands and technologies of learning markets; consumers, who need better guidance about the options available to meet learning needs; and policymakers, who need to find more productive ways to meet our economy's growing need for flexible human capital.

In addition to developing better information about the adult learning system, public and private policymakers should consider the following options for action:

- Reduce emphasis on academic degrees.
- Focus on evaluation of competency and achievement.
- Expand research, development, and transfer of learning technology.
- Develop human capital investment advisory services.
- Focus telematics industry products and services on the adult learning market.
- Revise the financing of human capital development.

Defusing a potentially explosive human capital crisis and capturing the opportunities of a new, postindustrial economy require cooperative action now by business, government, worker organizations, and others to build a new learning enterprise.

CHAPTER 1

Threat

Human Capital Crisis: Four Fs

HUMAN CAPITAL is the combination of innate talent, knowledge, skill, and experience that makes each human a valuable contributor to economic production. Learning is the process through which human capital grows. As we proceed through the transition to a new, postindustrial economy, human capital and the learning that generates it are becoming ever more critical to healthy economic development.

Economist John Kendrick attributes 22 percent of the growth in America's total factor productivity between 1948 and 1966 to the education and training that develop human capital. For the period 1966 to 1977, he finds that the education and training of the labor force account for 54 percent of the much lower rate of productivity growth that the U.S. economy has experienced since the early 1970s.[1]

Management expert Peter Drucker concludes: "The switch to knowledge work as the economy's growth area and the large-scale movement to new technology mean above all that productivity will increasingly be determined by the knowledge and skill workers put into their task."[2]

At the same time that human capital is becoming the key requirement of economic development, America's human capital "infrastructure" is being exposed as critically inadequate. The chief dimensions of this looming human capital crisis can be summarized under four Fs: Function, Fit, Flexibility, and Frustration.

Function

Some 20 percent of American adults are functionally illiterate—unable to read a job notice, fill out a job application, or make change.[3] Twenty million English-speaking,

native-born American adults read or write so poorly that they "have trouble holding jobs or suffer loss of self-esteem," according to the International Reading Association.[4]

Not only does functional illiteracy handicap the individuals affected, it imposes enormous costs on American employers. For example, Vimasco Corp., a small West Virginia firm, estimates that illiteracy costs it $25,000 per year, or 15 percent of its hourly payroll, in lost productivity.[5] Before the breakup of the Bell system, AT&T was spending $6 million a year to teach 14,000 employees basic reading and math.[6] The U.S. Department of Defense (DOD) expects to spend $20.4 million on training in basic skills in 1984, an increase of over 40 percent from 1979.[7] Some experts guess that a fifth or even a quarter of the $30 billion to $50 billion corporations spend each year on employee training is devoted simply to remedying functional deficiencies in basic skills.

Fit

A growing number of adults have knowledge and skills which, though extensive, no longer fit the technological and other requirements of a rapidly changing economy. Most likely to be displaced by the new wave of automation and cost-cutting are not the unskilled, entry-level workers, but rather the experienced—and expensive—skilled blue-collar workers, white-collar middle managers in business and government, and even professionals such as lawyers and doctors.

Today, between 3.5 million and 4 million U.S. workers are structurally unemployed—that is, faced with the permanent loss of their old jobs because of shifts in the economy.[8] The combination of robotization and foreign competition is expected to lead to the displacement of 10 million to 15 million manufacturing workers and a similar number of service workers by the next decade.[9]

More white-collar workers than blue-collar workers will have their careers disrupted by new technology. Peter Cunningham, president of INPUT Corp., estimates that 20 percent to 50 percent of today's office jobs will be eliminated by automation.[10]

Flexibility

One by-product of the growth of the knowledge sector and the spread of telematic technologies (that is, the combination of computers and telecommunications) is the increasing transience and dynamism of work. Today, some 36 percent of the adult working population is either in a work transition or anticipating one—each year some 15 million men and women change their occupation.[11]

Between 15 percent and 20 percent of the work force is employed part-time. Temporary services, which 20 years ago was a $159-million-a-year industry employing only 400,000 people mostly in secretarial and clerical jobs, today has grown to $5 billion in annual sales and employs 4 million people annually in industrial, marketing, technical, security, legal, accounting, health care, and executive positions, in addition to its traditional office jobs.[12]

And, because telematic technology permits knowledge work to be totally decentralized, by the next century as many as 30 percent of American workers are projected to be "telecommuters"—working outside of any factory or office.

If America is to regain its competitive edge in the world economy, workers and managers will have to be more flexible to adapt their knowledge and skills to the rapidly changing requirements of technological innovation and international competition. The need for flexible, adaptive human capital affects virtually every member of the adult work force and creates an unprecedented requirement for continual adult retraining.

Bernard Anderson of the Rockefeller Foundation claims that "workers typically will have to be retrained every four or five years for different occupational careers."[13] And, a recent report by the U.S. Congress' Office of Technology Assessment (OTA) concludes: "The day is fast approaching when career-related training and education at all occupational levels will be a lifelong process and possibly a mandatory one."[14]

Frustration

The "fourth F" is worker frustration. It is the most dangerous factor underlying the looming human capital

crisis, and it results from the failure to deal adequately with the needs represented by the previous three. A society that has a large number of workers unprepared to function productively, that employs a work force with mostly obsolescent skills, and that lacks a systematic process to quickly adapt its human capital to changing technologies and market conditions is a society in jeopardy.

A structural economic revolution contains the threat of turbulent, even violent, social upheaval as the economic ambitions of a major portion of the working population become increasingly frustrated. The past technological revolutions in agriculture and manufacturing were marked by strikes, riots, and rebellions; the transition to a postindustrial economy could be equally distressed.

The danger of worker frustration depends not only on the number of available jobs, but also on occupational status, the quality of work, and the opportunities for advancement and mobility. In fact, frustrations are growing today along all these dimensions.

A Polarized Work Force

A recent report on the future of work by the AFL-CIO agonized particularly about the prospect of a polarized work force:

> [A] two-tier work force is developing. . . . At the top will be a few executives, scientists and engineers, professionals, and managers, performing high-level, creative, high-paid full-time jobs in a good work environment. . . . At the bottom will be low-paid workers performing relatively simple, low-skill, dull, routine, high-turnover jobs in a poor work environment. . . . Between these two major tiers will be fewer and fewer permanent, well-paid, full-time, skilled, semi-skilled, and craft production and maintenance jobs which in the past have offered hope and opportunity and upward mobility to workers who start in low-paid, entry-level jobs. Many middle-management jobs also will be gone.[5]

Ironically, labor unions themselves may be contributing to the polarization of the work force through their growing acceptance of two-tier contracts. These contracts,

which recently have been signed with such firms as Boeing, Lockheed, McDonnell Douglas, Giant Food, Safeway Stores, American Airlines, Briggs & Stratton, and Dow Chemical, preserve the wages of existing union members by sharply reducing—up to 50 percent in some cases—the wages paid to new employees.[16] AFL-CIO economist John Zalusky predicts that such agreements will lead to a plunge in productivity in future years, when companies have two distinct employee classes receiving unequal pay for equal work.[17]

A Threatened Professional Class

The changes in required skills and obsolescence of middle-class work may provoke even greater frustration among managers and professionals than among industrial workers. For this group, the impact of technological change and structural economic shifts is compounded by the pressures of the demographic wave produced by the "baby boom" and subsequent "baby bust."

For example, from 1980 to 1990, the number of people 35 to 44 years old, the prime age for middle managers, will increase 42 percent. However, the Bureau of Labor Statistics (BLS) projects that jobs for middle managers will increase by only 19 percent.[18]

The intense competition for executive jobs will be further inflamed by the just demands of a steadily growing number of women—two of every three entrants to the work force during this decade—and minorities for their share of leadership positions.

Professions, such as law and medicine, are being glutted by the baby-boom generation:

- In the past 10 years, the number of lawyers in the United States grew by 83 percent and may double in the next decade. America now has five times more lawyers per capita than West Germany, 10 times more than France, and 20 times more than Japan. The legal profession is troubled more and more by declining income, underemployment, and even unemployment.[19]
- The number of licensed physicians went from 334,000 in 1970 to 490,000 today and is expected to grow to 536,000 in 1990, when there will be a surplus of 63,000

medical doctors. Even now, only 53 percent of physicians in private practice are working at full capacity.[20]

Not only are such professions oversupplied, but technological progress—particularly in the advanced computer technologies labeled artificial intelligence (AI)—may have as broad an impact on the number and quality of these jobs as robotics is having on industrial crafts. For example, researchers now are working on "expert systems" that can perform the diagnostic functions normally provided by a highly trained physician. Others are working on machines that seem to think as lawyers do.[21]

Things to Come

Some economists argue that the frustrations and fears that attend technological innovation are unfounded. In the past, they note, technological change always led to greater prosperity, wider employment opportunities, and increasingly productive work.

But Nobel-laureate economist Wassily Leontief observes that it was a unique characteristic of the technology of the industrial age that created demand for progressively skilled labor which, in turn, produced a growing middle class. In the new postindustrial wave of automation, says Leontief, "not only the physical but also the controlling 'mental' functions involved in the production of goods and services can be performed without the participation of human labor." And thus, the new automation may lead to a general reduction in employment opportunities.[22]

A portent of these trends may be seen in Japan, a bellwether nation that has led the United States in industrial automation. In fact, the tradition of "lifetime employment" is vanishing in Japan, and the country is struggling to find adequate employment opportunities for its workers. Part-time employment is growing rapidly: in supermarkets, for instance, 44 percent of employees are now part-timers, up from 33 percent in 1976. Skilled machinists are being replaced by part-time women workers.

Although the official unemployment rate in Japan seems low by U.S. standards, disguised joblessness—ex-

cess employees who have no real work to do—is now estimated at 10 percent of the labor force, up from 3 percent in 1979. Superfluous white-collar workers are called "window watchers" because they have nothing to do but look out the window all day.

Japan's usually docile labor unions have become restive. They are campaigning to get the workweek shortened, to slow the growth of part-time work, and to spread work by persuading workers to take all paid vacation time.[23]

CHAPTER 2

Opportunity

The Fourth Sector

LEADING FUTURISTS—Daniel Bell, Alvin Toffler, and John Naisbitt—tell us that we are at the threshold of an economic transformation as sweeping as the Agricultural Revolution and the Industrial Revolution: the rise of a postindustrial economy, in which information, communication, and expertise become the key factors of economic performance.

The waves of technological change entail massive shifts in the distribution of employment and the nature of work:

- Agriculture, which employed 70 percent of the labor force as recently as 1920, now employs only 4 percent of the work force and will account for only 2.5 percent of the jobs in the 1990s.[24]
- Manufacturing, which provided one of every four American jobs in 1960, accounted for only one of every five jobs in 1980 and will account for fewer than one job in six by the 1990s.[25] Today, only 10 percent of the U.S. labor force actually makes a product, and the number will decline over the next decade to only 5 percent to 7 percent.[26]
- From 1940 to 1980, service industries' share of total employment went from 45 percent to about 70 percent, and, in the next decade, the shift to a predominantly services-based economy will be nearly complete.[27]

When mechanization swept the agricultural sector, a growing industrial sector was able to absorb the displaced farmers and field hands. When automation took off in manufacturing, an expanding services sector provided new job opportunities. But the postindustrial tide of automation is eliminating more skilled jobs in services than

even in other sectors, raising the questions: Where are the displaced workers going to go? Where are the new job opportunities going to be found?

The most hopeful answer lies in the growth of the knowledge sector as a unique, fourth sector of the economy (after agriculture, mining construction-manufacturing, and services).

Knowledge-work is rapidly becoming the major form of employment. Over the past 40 years, every 100 manufacturing jobs lost were replaced with 250 of what David Birch of the Massachusetts Institute of Technology (MIT) calls "thoughtware" jobs.[28] By the beginning of the next century, nearly three-quarters of American workers could be employed in knowledge related jobs—performing functions that require uniquely human intelligence, imagination, and creativity.

The Learning Enterprise: A Key Industry

If the bright opportunity offered by the knowledge economy is to be realized, continual learning by the mainstream of work-force adults must become a central economic enterprise—the keystone industry of the fourth sector. People doing knowledge work will find that the skills required to create and process knowledge productively are the basic skills of learning. Learning, then, will not only be needed to facilitate work-life transitions, but will be a major form of work in the emerging economy.

The role of the new *learning enterprise* in the postindustrial economy is far more pervasive and productive than that of the traditional, industrial-age institutions of adult education and training. The new economy demands an adult learning system that is entrepreneurial, competitive, and consumer directed, and that employs the most powerful and efficient modern information technologies.

The foundation of the new *learning enterprise* is already in place. Basic research in cognitive science and artificial intelligence is constantly expanding knowledge of the learning process. Burgeoning computer and communication technologies are exploding the delivery media for instructional services. Proprietary schools are growing

rapidly. Computer software producers have targeted education and training as key markets. Even conventional higher education institutions, faced with a declining population of traditional 18- to 22-year-old students, are becoming more competitive and consumer-oriented.

However, to cultivate the further development of the learning enterprise, we need to recognize and then rectify some critical gaps in existing public and private policies concerning education, training, economic development, management, and human capital.

CHAPTER 3

Policy

Policy Gaps

PUBLIC AND PRIVATE POLICIES are lagging behind the challenges presented by the transition to the knowledge economy. The kind of learning enterprise that will be critical to the fourth sector of the emerging economy falls within the gaps in the existing policies of both government and employers.

In general, the relevant policies, both public and private, are aimed more at protecting the holders of existing jobs from the threat of change than at facilitating work transitions:

- Public employment and training programs such as the defunct Comprehensive Employment and Training Act (CETA) or the Trade Adjustment and Assistance Act have worked, in practice, to protect the jobs of the employed by buying off the unemployed with income maintenance.
- Through seniority rules, acceptance of "two-tier" contracts, and similar practices, unions work to preserve existing jobs and income of their employed members.
- Corporate policies such as "golden parachutes" and "poisoned pills" are designed to protect the jobs and income of senior management executives.
- Professional societies have collaborated with the state to regulate the supply of practitioners and thereby shield their members from competition.

The underlying theme is not simply that the worker is entitled to employment, but that the current holder of a particularly defined job has a proprietary interest in that position. There is, throughout our entire national system of employment, a voracious hunger for tenure.

This policy paradigm delays the necessary adaptation of the entire U.S. economy to the forces of global competition and technological change. It largely omits any systematic process for adapting the knowledge and skills of workers at all levels to changing needs and opportunities. Conventional policies concerning education, training, economic development, the relationship between employer and worker, and the distribution of responsibility for investment in human capital are broadly unresponsive to the challenges of the postindustrial age.

The Education Policy Gap

At a time when the adult working population confronts a festering crisis of inability to function, poor fit of skills to work, insufficient flexibility to adapt to new conditions, and growing frustration in the face of change, public education policy is fundamentally misdirected. The flourishing debate about education is doing little to defuse America's human capital crisis, because the framework of education policy so far remains fixated on youth instead of adults, on established institutions rather than innovative technologies, on pay rather than productivity, and on the interests of providers rather than the needs of consumers.

Last year, a slew of national commission reports and studies focused political attention on the poor performance of America's schools. A consistent theme of such reports as *A Nation at Risk: The Imperative for Educational Reform* (U.S. Dept. of Education, 1983) is that the country's economic development depends on improving elementary and secondary education.

Although the welfare of our children is an important concern, these reports have had the unfortunate effect of muddling public perception of the critical relationship between learning and economic development. We must recognize that:

- the bulk of the baby-boom generation is already past school age—over three-quarters of the people who will comprise the American work force of the year 2000 are adults today;

- a fifth of the existing adult work force is functionally illiterate—there are more adult illiterates in the United States than students in private and public secondary schools;
- forecasters anticipate that technological and economic change will compel the average worker to change careers four times or more during a working lifetime—"lifelong learners" is no longer a euphemism for dilettantes and hobbyists but an absolute necessity of economic competition.

What this means is that, if we could wave a magic wand and create perfect elementary and secondary schools tomorrow, the result (however desirable for our children) would have no major impact on the U.S. economy for the next two to three decades.

In short, the current frenzy over "education" (children and schools) obscures an *adult learning* crisis that is what really will put this nation's economy "at risk" between now and the beginning of the next century.

Besides the bias toward youth, current education policy also tends to be infatuated with the amount of education and neglects the quality of learning, its economic relevance, and the need for productivity and innovation in the processes of learning.

Overeducation and Underemployment

Whatever may be the solution to the "four Fs" of America's looming human capital crisis, simply more education cannot be it. "If anything," writes Thomas J. Moore, "the educational establishment is part of the problem. In its effort to attract students and obtain federal subsidies, it has often oversold college credentials as a ticket to good jobs."[29]

The facts indicate that if our educational policy is concerned only with the *amount* of schooling, the United States may have too much of it:

- the number of college-educated members of the work force grew by 126 percent since 1970;
- over the past decade, graduate school enrollment increased by 22.4 percent;

- from 1973 to 1981, the number of institutions offering doctorate degrees grew 36 percent to 452, and the number offering masters degrees grew 22 percent to 662.[10]

The result of all this sprawl of higher education not only has been a decline in quality—a "pall of mediocrity" threatens graduate education according to a recent study for the Carnegie Foundation for the Advancement of Teaching—but also a rising tide of *overeducated underemployed* graduates:

- in the 1970s, one-fifth of college graduates took jobs that did not require a college degree;
- 25 to 35 percent of recent college graduates are estimated to be underemployed;
- in the 1980s, nearly half of those who go to work after graduation will not get the kind of job traditionally held by college graduates—there will be a surplus of 200,000 to 300,000 graduates per year;
- in a study of more than 20,000 members of the high school class of 1972, 43 percent of those with a college degree were not doing college-level work;
- the number of college graduates seeking work grew three times faster than the total work force since 1970;
- government indirectly and directly generated 50 percent of all jobs held by college graduates in 1980, compared with only about one-third of all employment; and
- in 1982, college graduates were twice as likely to be working in a blue-collar or service job as they were 12 years earlier.[11]

A generation ago, virtually any investment in more education offered an attractive rate of return—the cost of education was more than paid back by the greater incomes commanded by college graduates and those with advanced degrees. But the return on investment in generic education has become increasingly dubious for all concerned. The soaring costs of traditional classroom instruction combined with the uncertain employment opportunities for graduates in all but a few, in-demand technical fields have made the investment in education far more risky. Now, whole institutions as well as legions of

graduates are defaulting on government-insured loans. The door of opportunity once offered by "more education" is steadily closing.

Productivity and Technology in Education

Perhaps the most serious policy gap in this field, and education's most serious shortcoming, is the studied indifference to productivity in educational institutions which is matched by a glacial rate of technological innovation. The predominant technology of formal education ranges from nearly 100 to over 1,000 years old.

In the midst of an information revolution, formal education seems to be standing still or even going backwards. In a study by the late Ithiel de Sola Pool at MIT of trends in the productivity of 17 communications media over the period 1960 to 1977, "education" (i.e., classroom instruction) was the only one to show a "striking increase in cost"; nearly all the others showed a moderate to dramatic decline in cost.[32] In 1982, while general consumer prices rose less than 4 percent, education-related consumer costs rose 12 percent.[33]

The great clamor in educational policy is over faculty salaries. At the elementary/secondary level, competent math and science teachers have been lured to entry-level jobs in industry that pay 40 percent or 50 percent more than the salary of an experienced teacher. In colleges and universities, up to half the faculty jobs in such high-demand fields as computer science, electrical engineering, and genetics go unfilled. Gene Bottoms of the American Vocational Association points out that, in vocational education institutions, many graduates get higher salaries than beginning teaching staff.[34]

Among the many recent reports on educational policy, there seems to be a consensus that higher pay—either across-the-board, for high-demand fields, or based on some concept of "merit"—is needed to attract and hold higher-caliber teachers. Yet the logic now accepted in such industries as steel, automobiles, machine tools, and airlines—that pay must be proportional to productivity—generally has not been applied to education.

If it were technologically infeasible to increase the productivity of education, this attitude might be understandable. But the revolution now under way in computation and telecommunication technology actually offers the opportunity to vastly expand the productivity of the learning process for learners of all ages. A recent study of instructional technology by OTA concluded that:

> Costs for labor-intensive education and training methods continue to climb faster than the inflation rate, while costs for information technology continue to drop precipitously. These trends will result in a steadily growing number of applications in which technology-based instruction is clearly the most cost-effective method.[35]

And, a research conference on computers in education sponsored by the U.S. Department of Education concluded that "striking improvement in the quality and productivity of instructional computer systems is attainable with a coherent and sustained research investment."[36]

A few institutions are pushing technological innovation. At MIT, Project Athena, initiated by Dean Jerry Wilson of the school of engineering, is a five-year plan to explore the use of computers in teaching with $50 million in equipment and other support donated by IBM and Digital Equipment Corp.[37] And Carnegie-Mellon University, a leader in applying computers widely to instruction in the arts and humanities in addition to science and technical fields, is planning to create an integrated network, with help from IBM, linking up to 8,000 campus computers.[38]

Nevertheless, rather than emphasize the computer as a medium to expand the productivity of instruction, many of the recent education reports focus on making the computer a *subject* of instruction, an adjunct component of "literacy" to be conveyed through traditional classroom methods. Marc Tucker, director of the Carnegie Corporation's Project on Instructional Technology and Education, condemns this tendency bluntly: "What's going on in the majority of schools in the name of computer literacy is misguided."[39]

Computer literacy cannot be taught because the technology is evolving so rapidly that current knowledge becomes obsolete in a matter of months. Computer literacy

need not be taught because the technology is rapidly becoming so "user friendly" that the vast majority of computer users will never need to know more about how a computer works than they can learn in a few minutes. "Five years from now," says Esther Dyson, president of EDventure, publisher of a respected computer industry newsletter, "people won't need to be computer-literate. Computers will be people-literate."[40]

The mania for computer literacy only serves to distract attention from the growing opportunity and urgent need to apply modern technology to enhancing the productivity of education. John Diebold, a leading authority on information technology industries, observes that education in general is a "major area that has been slow to adopt the computer, which is probably the most important thing to happen to that field since the printing press."[41]

While there are only about a quarter of a million computers in instructional use in elementary/secondary schools today, there are computers in more than 10 million homes, and the latter number could double within the next year. Sales of desktop computers for both home and business are exploding—IBM sold more Personal Computers (PCs) in the first two months of 1984 than in the previous two years. Infocorp., a market research firm, estimates that a computer will be found in nearly one of three American households by the end of 1985, and in eight of ten by the end of the century.[42]

Another leading market analyst, Future Computing Inc., claims that over 70 percent of educational software will be sold to the home market by 1987.[43] A new generation of educational games will ring up annual sales of $3 billion in five years, according to Electronic Arts, a leading software publisher.[44]

By the next decade, not only will most U.S. homes have computers of growing sophistication, the majority also will have broadband communications access—via cable television and/or videotex (two-way, interactive video by telephone or cable)—to a burgeoning array of interactive information resources. Employees will find even more powerful technologies—for example, micro-mainframe computers linked in local networks, interactive video-

disks, and videoconferencing—available for learning on the job.

The Software Gap

The main technological barrier to vastly increasing the productivity and accessibility of learning is no longer hardware but software. OTA's two-year-old report found "general widespread agreement that, with few exceptions, the quality of educational software—curriculum material designed for educational technology—now available was, in general, not very good."[35]

But two or three years in today's explosive information industry is practically a lifetime. In just three years, video games went from being a minor adjunct of the toy business to a $7-billion-a-year entertainment industry, with sales greater than motion pictures or recorded music. (The shakeout came just as suddenly; revenues declined by more than 30 percent in one year.) Hundreds of entrepreneurs, some barely teenagers, suddenly emerged to make quick fortunes by designing software for the game market.

In fact, the market for computer software of all kinds is booming. This year, 20,000 new software products will be marketed—equal to nearly half the number of new books published (and computer-related books are the hottest category of book sales).

Recent advances in artificial intelligence research promise to advance the state of the art of learning technology rapidly. DEBUGGY, developed at the Xerox Palo Alto Research Center (which spawned many of the advances in user-friendly design incorporated in Apple's new Macintosh line), is in the mainstream of work on computer-aided instruction, one of the most active subfields of Artificial Intelligence (AI) research. DEBUGGY is a "responsive tutor," a program which adapts itself to the learning needs of an individual student—a quantum advance over the "programmed learning" of the 1960s and the ill-conceived "computer literacy" efforts of recent years.[36]

As the market for video games has leveled off, computer entrepreneurs are turning their attention to the instructional market. A recent issue of *Electronic Learning* listed 200 educational software producers, and a 1980 in-

dustry study identified some 304 educational software developers.[17] Future Computing, Inc. estimates that sales of educational software will exceed $1 billion a year by 1987, roughly three-quarters of which will be for software to use in the home rather than in schools.[18] William Norris, chairman of the Control Data Corporation, and an early and persistent believer in the importance of the learning market, asserts that "fifteen years from now, education is going to be the largest source of (Control Data's) revenues and profits."[19]

The Rise of Telematic Learning

The thrust of these technological trends is unmistakable. The traditional school—a centralized edifice, compartmentalized into a warren of classrooms, each stratified with regimented rows of desks, and relying on lecture/recitation as the principal medium of instruction—will have almost as little place in the 21st century's learning enterprise as the blacksmith shop has in today's transportation industry.

The vanguard of tomorrow's learning industry can be seen in such new, network organizations as Telelearning Systems, Inc. and National Education Corporation's EDNET. These enterprises are a quantum advance over traditional correspondence courses. They are set up to distribute instructional services directly to consumers virtually anywhere that a personal computer can be hooked to a telephone line. And, unlike courses by mail, they permit direct two-way communication between student and teacher or among students.

The automation of learning will not replace the day-care function of elementary/secondary schools, but it can help reduce costs while enabling students to learn more, faster.

For adults, telematic technologies attack the two most frequently cited barriers to participation in organized learning: cost and time. Telematic learning will be cheaper because of lower overhead and greater competition. And it will not only save the time lost in travel and in the inefficiencies of classroom instruction but also will permit learning to be scheduled at the convenience of the consumer.

Telematic learning also will give professional educators the opportunity to earn virtually unlimited income by selling the products of their instructional talents to audiences of hundreds or thousands or even millions, instead of to a classroom of only a few dozen students.

Despite these dramatic implications, the telematic revolution has yet to be accommodated by public education policy. Policy that remains locked in to the traditional *form* of education increasingly will obstruct the *function* of learning.

The Training Policy Gap

In 1983, before the diversification of the Bell system, AT&T signed a milestone contract with its major employee unions that committed the corporation to a $36 million program of training and retraining, open to all employees with more than one year of seniority. What made this agreement a watershed was that the training/retraining to be provided is not geared to any specific job but is general in nature. Thus workers whose jobs are threatened by technological innovation have the opportunity under this program to be trained for new careers, by their current employer.

Commenting on the significance of the AT&T contract, Paul Strassman of Xerox noted that "the union is now seeing education as big an issue as wages and benefits." And TRW economist Pat Choate characterizes the agreement as being "on the cutting edge of where the whole country is going."[50]

While progressive companies and labor organizations such as AT&T and the Communication Workers of America are creating innovative arrangements for meeting the human capital needs of a new economy, public policy on training and retraining is hobbled by outworn assumptions and misguided efforts.

A Narrow Focus

A basic flaw in government policy on training is the focus on a limited range of training needs and opportunities. Training is actually a large, sophisticated,

growth industry. The training provided within corporations is as large an enterprise as all of formal higher education, accounting for $30 billion to $50 billion in annual expenditures and employing about 700,000 full- and part-time instructors.[51] And the number of institutions providing vocational education in the United States has grown from only 600 in 1960 to over 8,000 today.[52]

The DOD is the largest single trainer in the United States (and probably the world). In fiscal year 1985, DOD will invest nearly $18 billion and 260,000 person-years (full-time equivalent) in formal (institutional) training and education. Since World War II, millions of veterans have received additional educational benefits from military service through the famous "GI Bill" and special tuition-aid programs that succeeded it. The opportunity for training and education is critical to military recruitment. DOD surveys show that "training for a civilian job" is given as the principal reason for enlisting by the largest number (28 percent) of new recruits. "Better myself in life," is given as the main reason by the next largest segment of enlistees (20 percent), followed by "money for college education" (15 percent).[53]

In a study for the American Society for Training and Development, Anthony Carnevale and Harold Goldstein concluded that the amount of training demanded by the U.S. economy will increase faster than total employment during the 1980s. The reason: not only will the fastest growth in the labor force be in the 25- to 44-year-old age cohort—the very age group that receives the most training—but employment growth will be concentrated in just those industries that require the most training.[54]

Yet public policy addresses only a very narrow segment of the broad spectrum of training activity, ignoring many of the important needs for economic development. Existing vocational education focuses heavily on entry level training, and neglects the needs for retraining as well as the needs of advanced-level, skilled workers.[55]

"The public training programs that do exist serve less than 8 percent of the population," says Pat Choate; and, "they focus primarily on the economically and culturally disadvantaged and provide some entry level training while

giving very limited attention to retraining employed workers and upgrading their skills."[56]

Echoing this view, a report of the Business-Higher Education Forum concludes that ". . . the scope of existing policies on education, training and retraining, which concentrate primarily on youth and the disadvantaged, must be expanded to include the entire work force."[57]

Though publicly funded training programs concentrate heavily on the young, disadvantaged, and hard-core unemployed, the total universe of training and continuing education is slanted heavily in favor of those who are already most well-off. Better-educated workers receive a disproportionately large share of all training. In 1981, workers with four or more years of college were 18 percent of the labor force, but 35 percent of the trainees. Those with one to three years of college were also 18 percent of the labor force, but 27 percent of the trainees. At the other extreme, workers with less than a full high school education were 23 percent of the labor force but only 5 percent of the trainees.[58]

So, private training resources are skewed toward the top of the job pyramid, while publicly funded job programs concentrate on the very bottom, leaving the mass of workers in the middle—the ones whose jobs are most threatened by technological and economic changes—with the least support for training or retraining.

Large versus Small Employers

Another distortion in training policy rests on the different roles in employment of large versus small companies. In the past decade, small businesses provided the great majority of employment growth in the U.S. economy; Fortune 500 corporations contributed only a few thousand of the roughly 20 million new jobs that were created.

Small companies are the nation's major training ground for new workers, in effect subsidizing the training costs of big corporations as smaller businesses lose experienced workers to the higher pay larger firms can afford. Companies with fewer than 100 employees account for 58 percent of total employment, but they hire 67 percent of first-time workers. Yet most federal training grants go to big, not small, companies.[59]

Skill Obsolescence

Many vocational education and training programs—particularly those provided by the public sector—give training in skills and vocations that are already out-of-date. Such programs persisted in training welders and lathe operators long after robots and computers had made those jobs obsolete. High-tech companies find that graduates of even top-grade engineering schools require substantial additional in-house training to catch up with the latest technology.

"It's important to spot the obsolete occupations and get the training for those jobs out of our educational system," argues consultant Clyde Helms. "Teachers who are educating students who go out and stand in unemployment lines are just as obsolete as their graduates."[9] But eliminating obsolete training will not, by itself, meet the need for durable, future-relevant training.

The basic problem of skill obsolescence results from the isolation of training from the rapidly changing real world of work. Several forces conspire to insulate current training from work:

- The major complaints of vocational education institutions, community colleges, and even major universities are a lack of modern equipment and a shortage of up-to-date faculty in key technical fields.
- The kind of high-tech equipment now used in industry is not only very expensive, but the rate of obsolescence in such fields as computers and semiconductors is so high that companies themselves are often hard-pressed to keep up with the state of the art. Under these conditions, getting the latest equipment into schools is extremely difficult.
- Full-time engineering and technology faculty are virtually doomed to obsolescence. Not only does industry offer far more lucrative salaries than educational institutions for experts in "growth" fields, but faculty simply cannot keep current with technology except by working at least part-time in private business. Even scientists interested in basic research, in such fields as genetics, artificial intelligence, and some branches of mathematics, are attracted to corporations rather than universities.

- Unions and professional societies often work against training and education programs that threaten their members with increased competition. Training in obsolete skills often proliferates simply because it is unopposed.
- Employers and managers historically have been inadequately involved in the training process. Many external training and education programs proceed without their participation. Even inside their own organizations, line managers are often uninterested in (and unrewarded for) employee training and development. Instead, they delegate that responsibility to personnel officers who often lack the intimate acquaintance with changing technologies and operations needed to anticipate future skill requirements.
- Teaching credentials of various kinds often prevent those who have up-to-date skills and knowledge, and who want to teach others, from doing so. Formal education institutions commonly will not give faculty positions to individuals who lack the "right" academic degrees. Part-time teaching is discouraged by inferior pay and status. Accreditation and other regulations discriminate against on-the-job and nontraditional alternatives to educational institutions.

The skill-obsolescence gap between training and employment is generated by turbulent technological and economic changes that will continue for decades to come. Bridging this gap will require a more intimate mixing of learning and work. Continual learning must become accepted as a necessary part of any job. And those who perform and manage productive work must become more directly involved in training others for work.

The Job Training Partnership Act

The focal point of public policy on training/retraining today is the federal Job Training Partnership Act (JTPA), created last year to replace the ill-fated CETA program. CETA's critics charged that the program degenerated into an income-maintenance program for the unemployed, provided "training" of little economic value, and got real jobs for only a few percent of its participants.

JTPA expects to produce 800,000 to 1 million trainees in fiscal year 1984 at a cost to the U.S. Treasury of $3.5 billion. To help insure that training is relevant to real employment opportunities, the program is guided by 594 local private industry councils. Furthermore, funding is contingent on successfully placing a minimum percentage of trainees into jobs.

While it is too soon to measure the actual impact of JTPA, critics charge that, by tying funding to successful job placement of trainees, the program is designed to enlist the best prospects—those most likely to be employed anyway—and leave the worst cases on the street.[91]

But the basic problem with JTPA and similar programs to train or retrain the unemployed is that the most disadvantaged workers are less in need of job-specific training than of help with basic skills prerequisite to being trainable and employable. For instance, as Marc Bendick, Jr. of the Urban Institute points out, one-third of dislocated workers lack a high school diploma, and another third have diplomas but are still functionally illiterate.[92]

Employers will continue to provide the great majority of job-related training. Private industry expenditures on training/retraining are at least 10 times the amount of the total JTPA budget. Even government spends more on training its own employees than on such civilian training programs as JTPA. The Pentagon alone spends about five times the JTPA budget on institutional training and education for military personnel.

What private employers resent is having to spend a fifth or a quarter of their training dollars to teach basic skills that, many employers feel, should have been conveyed by public education (for which, by the way, they already have paid once through taxes).

The glaring gaps in public policy left by JTPA and similar programs are the neglect of: (1) the retraining needs of the large middle tier of employed but at-risk workers (including homemakers); and (2) the basic skill needs of the 20 million or so functionally illiterate workforce adults who will not be touched by reforms in elementary/secondary education, and whose learning handicaps prevent them from benefiting from job-specific training.

Paul Barton of the National Institute for Work and Learning recommends that, "Rather than repeat past mistakes by creating large programs with preselected training 'slots' into which workers are fit, we should assess worker needs and aspirations on an individual basis and purchase appropriate training from the best possible facility for each particular skill."[63]

Individual Training Accounts

One step in this direction, suggested by Pat Choate, would be a program of Individual Training Accounts (ITA), similar to Individual Retirement Accounts (IRA). Though the specifics of an ITA program are still being debated, the general concept is that employers and employees would make equal, tax-free contributions to the ITA, which then could be drawn from to pay for retraining when needed. The advantage of this approach is that it would direct resources toward the retraining needs of mainstream workers now neglected.

Two principal criticisms have been raised to the ITA proposal. One is that retraining is irrelevant to the overall need for jobs. As Eli Ginzberg, professor emeritus at Columbia University, puts it, "If there aren't any jobs, you can retrain people until the cows come home and it still won't do any good."[64]

The second key objection is that most workers lack either motivation or ability to direct their own training. Economists Robert Haveman and Gary Burtless note that unemployed workers given training vouchers in Denver and Seattle chose courses that failed to increase their earnings over a six-year period. And training expert John Bishop argues that the most significant barriers to participation in "school-based training programs" by the unemployed are the "fear and dislike that many adults have of schools" and the general lack of appropriate programs.[65]

Both objections serve to underscore the importance of the learning enterprise to future economic development. The first, that retraining will not create new jobs, is valid only within the limited framework of the passing industrial economy. In the emerging fourth sector—the knowledge

sector—continual adult learning is not only a prerequisite of employment but is actually a major form of work.

The second complaint, that workers are not currently able to make productive use of the resources the ITA would provide, emphasizes that more-of-the-same traditional, institution-based education and training will not serve the adult learning needs of the postindustrial economy. Rather, we need a high-tech, telematic learning enterprise, and workers who are trained to be effective consumers of the latest learning products and services.

ITA is a "demand-side" policy initiative that would direct resources to the learning needs of the mainstream of working-age adults. But a complementary, "supply-side" push is needed as well to cultivate the learning enterprise that can meet those learning demands.

The Economic Development Policy Gap

Traditionally, economic development has been a policy concern mainly of state and local governments in the United States. The federal role was relatively small until the New Deal. Even since then, the great majority of federal development programs—for example, in highway construction, water reclamation, electric power—have been regionally or locally oriented, with effective control vested in state and local agencies. (The federal role is most dominant in those states where a large portion of the territory is federally owned.)

Many of the conflicts and paradoxes in economic development policy derive from, on one hand, the fact of state dominance in such policy and, on the other, the limits on state sovereignty established by the U.S. Constitution. Because states cannot control the migration of capital and people across their borders, much of their competition for economic development becomes irrelevant or counterproductive.

High-Tech Mania

Confusion over the relationship between "jobs" (that is, "jobs" as a political issue as opposed to jobs as actual employment opportunities) and economic development in

the unrestricted common market that is the United States often traps states and localities in a negative-sum, competitive game colloquially labelled smokestack chasing. One of the worst examples is the current mania in development policy for anything high-tech, making smokestack chasing into chip chasing.

The meaning of "high-tech" is universally vague, but it usually includes computers, robotics, and bioengineering. "High-tech employment" generally refers to jobs directly involved in the development and production of such new, advanced technologies.

The reality is that if "high-tech" has any useful meaning for economic development, it is not to define an elite group of sunrise industries but to represent a technological renaissance crossing all economic sectors. Today's automobile, steel, chemical, and machine tool industries are as high-tech as any other in terms of sophistication and pace of innovation. It could be argued that agriculture is the most technology-intensive business in today's economy.

Whatever the economic benefits of high-tech industry may be, employment is among the least. Carnevale and Goldstein observe, "The notion that most Americans will be working in high technology occupations and industry in the near future is not supported by the available evidence. At best, high technology production will employ 10 percent of the American work force in the foreseeable future."[66]

High-tech industry in total will provide fewer than a million new jobs over the next decade, less than a tenth of what will be needed to avoid increased unemployment.[67] For example, while computer occupations will increase by more than 45 percent over the decade of the 1980s, this represents an increase of only 600,000 jobs—1.5 million to 2.1 million in 1990, still only 1.5 percent of the 1990 labor force.[68] High-tech simply will not have a major impact on total employment.

Nor will high-tech offer a panacea to the highly paid, skilled workers, in such heavy industries as automobiles and steel, displaced by the combination of foreign competition and technological renovation. There will not be enough high-tech jobs to go around. The displaced work-

ers will need to be thoroughly retrained to have any chance to get such jobs, and many of them, though skillful in their traditional work, lack the basic learning skills to be easily retrainable.

And, most of those who do make a successful migration from their high-wage industrial jobs to high-tech companies will be forced to accept lower wages, simply because no other industry pays as much as such basic industries as cars and steel. In 1982, the average wage in the steel industry was $530 a week; the figure for the electrical and electronics industries was $370 a week, close to the average for all manufacturers. But growing productivity and automation in all manufacturing mean that many displaced industrial workers will have to take jobs in service companies, where the average weekly wage was $242.[69]

Most of the jobs available during the 1980s, both new jobs and existing jobs, are not going to be high-tech jobs. According to the Bureau of Labor Statistics' (BLS) forecast, the following will be the fastest growing occupations in the U.S. economy during this decade[70]:

Nurse's Aide	94 thousand/year
Guard	70 "
Practical Nurse	60 "
Machine Repair	58 "
Computer Operator	46 "
Bank Clerk	45 "
Dining Room Attendant/Dishwasher	37 "
Homemaker/Home Health Aide	36 "
Bank Officer	28 "
Teacher's Aide	26 "

Only one of these jobs, computer operator, could be considered high-tech, and only one other, bank officer, would be judged a middle-class job. However, if we look not at growth but the total number of job openings annually for each occupation, the latter drop down the list and we get the following picture of what the majority of employment opportunities in the 1980s will be[71]:

Secretary/ Stenographer	305 thousand
Retail Sales Worker	226 "
Janitor	180 "
Cashier	119 "
Bookkeeper	96 "
Nurse's Aide, Orderly	94 "
Cook	86 "
K-6 Teacher	86 "
Registered Nurse	85 "
Assembler	77 "

Forecaster Marvin Cetron has argued that such official BLS projections understate future high-tech employment because they fail to account for jobs in all-new categories created by technological innovation. Cetron foresees substantial employment opportunities in such novel occupations as industrial laser process technician, industrial robot production technician, automotive fuel cell technician, nuclear medicine technologist, computer-assisted design (CAD) technician, and computer-assisted manufacturing (CAM) specialist.[72]

Official job forecasts almost certainly do not take adequate account of technological trends. But Cetron also may be underestimating the potential of emerging technologies to displace labor. For example, writer Bob Kuttner notes that, as manufacturing becomes ever more computer integrated, "The job of CAD/CAM technician, which is regarded as a hot new opportunity, will diminish, because the engineer himself will sit at the computer terminal and transform his specifications directly into a product."[73]

Cetron anticipates 800,000 jobs in the next decade for robot production technicians. But in Japan, the leader in the production and application of robotics, most of the work done in robot-producing factories is performed by . . . robots.

What is clear is that the major impact of so-called high technology on employment will not be in the production of the technology itself, but rather in the application of new technologies in many occupations across a wide range of industries—manufacturing, agriculture, transportation, health care, financial services, arts and entertainment, and government.

"The debate should not center on whether high-tech is the solution or the problem," says Lawrence Weiser of the University of Wisconsin. "The focus should be on how to provide job opportunities for all those who want to work and income maintenance for those who cannot find employment."[4]

Development and People

The recent mania over "high-tech" is symptomatic of a fundamental problem in development policy—the discontinuity between the individual person and the collective community. The relationship between the development of individual human capital and the development of the communal economy is not as simple as is often claimed. Confusion about the relationship can be an obstacle to development of both kinds.

Since the economic disaster of the Great Depression, "jobs" have been a central obsession of political rhetoric. Virtually every proposal in economic policy is justified in terms of its promise of "jobs." And, in political debate, that promise of collective "jobs" is presented as a symbol of the individual's hopes for economic security, independence, and advancement.

The reality is that macroeconomic development of a community (whether town, state, or nation) may be irrelevant to the economic prospects of some or even most of the members of that community. Such gross macroeconomic statistics as income, employment, and growth rates just do not say much about how any particular person is doing. On the other hand, the investments made in individual economic development—particularly in education and training but even in housing or insurance—are frequently out of tune with the broad trends leading toward a postindustrial society.

Conventional political wisdom implies that development is a one-dimensional process, with progress for all measured along a single line of growth. Instead, we need a two-dimensional framework for development policy that addresses the economic development of the community and the economic development of the individual as separate but interdependent goals.

Only in this more discriminating policy framework will we be able to appreciate the learning enterprise as both the essential instrument of individual advancement and the critical capital-forming industry of the postindustrial economy.

The one-dimensional rhetoric of political campaigns often seems to suggest that economic development is intended mainly to benefit working people, that those who pay the costs of development will receive the benefits, and that creating jobs is the same thing as creating work. These simplistic assumptions may be emotionally appealing, but they actually obstruct practical progress.

A more realistic, two-dimensional view of the development process compels us to grapple with the following complications:

- The economic development efforts of state and local governments are focused more on property than on people.
- The constitutional guarantee of free trade and migration within the United States and the high mobility of the American population mean that the impacts of local development can be neither confined nor accounted for locally.
- There is a substantial difference between creating jobs and creating work, comparable to the difference between distributing income and expanding income; furthermore, policies that contribute to one may be irrelevant and even contrary to the other.

Property and People

The traditional focus of economic development at the state and local levels is to increase the value of property located within the jurisdiction, particularly property that is immobile—land, natural resources, buildings, factories, and transportation facilities, for example. The owners of such assets are the main beneficiaries—and therefore are usually the most earnest advocates—of economic development.

Such property owners are interested in jobs only as one of several competing factors influencing the value of their property. Also, what is beneficial to the value of one

piece of local property often is detrimental to another, so even when one property owner may benefit from more jobs another will not.

This observation is not meant to suggest that there is an absolute conflict between "jobs" and economic development. Many working people are also property owners—commonly, of homes. And increased employment often may be necessary to developing the economic value of property.

But the correspondence, at the state and local levels, is not exactly one-to-one, and misunderstanding the relationship can lead to disappointment and frustration. For example, gentrification may increase the average standard of living in a given urban area. But it commonly does so by replacing the resident poor with an immigrant middle class, not by raising the original inhabitants to a higher level.

A case in point is Atlantic City, New Jersey. Though the legalization of casino gambling has contributed substantially to local economic development and to the state treasury, few benefits have accrued to original residents. Jobs have gone mainly to immigrants and there has been little multiplier effect on non-casino businesses. Most of the poor remain as they were or have been forced to leave.

Mobility and Locality

The second important complication we must contend with in development policy is the remarkable mobility of people in America. In a nation that constitutionally prohibits barriers to migration or commerce among the states, people are free to "vote with their feet" and move to wherever they can get the best reward for their labor. This freedom of migration—essential to making the United States the most prosperous common market in history—complicates the relationship of employment and human capital to economic development at the state and local levels.

Because people are free to move around, there is no way to create jobs locally just for the local residents who need them. Though it is commonplace for politicians to promise "jobs" as a benefit of their policies, the reality is that state and local governments—having no control over

currency, migration, or trade—are extremely limited in what they can do to affect the employment of their constituents. Attracting or cultivating industry in the name of "jobs" will not necessarily benefit current, unemployed residents who may not have the skills to get the jobs that will be created—some or all of which may actually be taken by immigrants from somewhere else.

A particular state or local government's investment in training and education may enable local residents to compete more effectively for new jobs. But that investment in human capital development also will enable those residents to compete for jobs located in another city or state. The only local benefit may be the reduction in unemployment insurance or welfare costs. But then, the very success of a local program that helped disadvantaged people to move up and out would be a magnet for disadvantaged immigrants from elsewhere.

By statistical measures, communities such as Boulder, Colorado or Austin, Texas that have employed growth controls to limit migration seem to have enjoyed considerable success in securing the benefits of economic development for their original residents. Omitted from the accounting, though, are the opportunity costs imposed on those who were prevented from immigrating or were forced to emigrate.

If people did not move around much, these paradoxes in local and state development policy caused by the freedom of migration might be dismissed as mere equivocation. But Americans actually are extraordinarily mobile. The 1980 census shows that, in most counties in the United States, roughly a sixth (frostbelt) to a third (sunbelt) of the local residents had moved from another part of the same state or from another state altogether within the previous five years.

With such a substantial proportion of "residents" continually coming and going, it becomes extremely difficult to trace who actually benefits and who actually pays when state and local governments attempt to create "jobs," whether directly or through traditional property-focused projects. And this omits the labyrinthine complications of the federal government's transfers of income from place to place and person to person.

While economic development of property is mainly a state and local interest, economic development of jobs—in terms of productive workers and opportunities for meaningful employment—is a national problem. This is not to say that employment is mainly a federal government concern, or even a government concern at all. Rather, it is simply to recognize that, within the United States, all citizens are free to compete in a single, national job market.

Jobs and Work

The third complication in thinking about development is that "jobs" and work are not the same thing. Work is what actually creates economic product. Jobs—that is, employment—is one of several mechanisms for distributing shares in the production process. Investment, debt, and taxation are other mechanisms for dividing up the stakes in production.

If the total amount of work in the economy were constant, the only way to expand employment would be through redistribution—dividing the economic pie into more slices. Government has a number of effective devices for doing this—from reducing the length of the workweek to taxing more private income in order to put more people on the public payroll.

There is a lot to be said for redistribution, but a basic problem with this option is that, at some point, it dilutes the incentives for work, investment, and overall economic growth. If the demand for employment is growing, simply slicing the economic pie into more pieces necessarily means taking income from some people to give it to others. The process tends to make the losers mad and to make the gainers complacent.

Increasing the total amount of work—expanding the economic pie—seems to be a more attractive way to increase employment without creating any absolute losers. If distribution is left constant, more work should mean more jobs, should it not?

Maybe. The problem is complicated by two things: technology and productivity. Work gets done by a combination of people and technology. Productivity is a measure

of how much work people get done—how much they produce—in a given period of time on the job. As new technology increases productivity, more work can get done without requiring more people, and perhaps even requiring fewer people, to do it.

So getting more work done—more economic product and a bigger pie—may not directly increase employment or fulfill the political promise of "jobs." In fact, productivity growth in specific industries may even lead to reduced employment, as we have seen in automobiles, metals, and other manufacturing industries.

The hope is that the greater income generated by increased productivity will be respent, creating demand for new products and services in other industries, and thus lead indirectly to more employment. But when technological innovation and productivity increases are occurring simultaneously throughout all sectors of the economy, expanding total production may take place with little increase or even with a loss of jobs.

It was fashionable for politicians to agonize about America's flagging productivity during the past decade. But by letting its productivity slip, the U.S. economy was able to create employment for about 80 percent of the tidal wave of new entrants to its work force—baby-boomers, women, and minorities—in the 1970s. During the same period, Western Europe outstripped the United States in productivity growth, but wound up with a net loss of 3 million jobs.

The growth of the fourth sector—the knowledge sector of the economy—offers at least partial deliverance from this quandary of postindustrial technology and employment. Because information is a virtually unlimited resource, the accelerating automation of information processing does not reduce the amount of human "knowledge work" to be done, but simply makes it more interesting.

It would take 5 trillion to 10 trillion human beings—more than a thousand times the earth's total human population—to do the work done by the world's current population of computers. Computers did not eliminate 5 trillion "jobs." Most of the work computers do simply would not be attempted if the computer did not exist.

Computers are eliminating some kinds of knowledge work—such as drafting, medical diagnosis, navigation, and bookkeeping. But the net effect is only to change the quality of knowledge work (usually for the better), not to reduce the quantity of employment opportunities. The advance of artificial intelligence will only increase the needs and opportunities for work that depends on uniquely human creativity and intelligence.

Although governments can affect the distribution of employment and income, there is much less that governments can do, in the short run at least, to create work. Work is mostly created by private initiative and entrepreneurship. Nearly all of the 20 million new jobs added to the U.S. economy during the 1970s were created in small- to mid-sized companies.

Broad areas of government policy can, of course, affect the general condition of the economy, along with the prospects for work and employment. At the federal level, an imbalanced monetary policy can damage trade or plunge the economy into recession, reducing employment en masse. Lax immigration policies permit illegal immigrants to take jobs that, at least in principle, could be available to American citizens. Protectionist trade measures, most economists agree, wind up costing more in employment than they save.

By avoiding or undoing such counterproductive policies, governments may provide a more congenial environment for economic growth, the creation of new work, and the possible expansion of employment. But removing barriers to enterprise—though eminently desirable—will not, by itself, deliver "jobs" any more than building a dam will necessarily bring rain.

There are some positive things governments can do to help create *new work*. They are generally in the nature of long-term investments. Support for basic research and development (R&D) is one. Building and maintaining the public capital infrastructure is another.

A third is to strengthen the linkage between individual human capital development and the development of the macroeconomy. The need is not only for the right kinds of human capital to do the work that is wanted,

Work is created by the imagination and initiative of individual people. People with the right kinds of human capital will create work and jobs for themselves and for others.

The need here is not for massive new entitlement programs or heroic industrial policies. The learning enterprise is the linchpin between individual development and macroeconomic development. Government can help cultivate the learning enterprise by:

- removing the barriers presented by existing training, education, and other policies;
- supporting basic research in cognitive science;
- encouraging the development and transfer of learning technology;
- developing and disseminating statistical information about the adult learning system; and
- facilitating communication between consumers and suppliers of learning products and services.

Neither high-tech nor economic development in general can solve the policy problem of jobs. The employment opportunities American workers desire do not flow directly or uniformly from all kinds of economic investment.

As the baby-boom generation ages and the numbers of young people entering the work force decline, there may even be a numerical surplus of several million jobs in the next few years. But many of the available jobs will be unattainable for adults who lack the right skills and knowledge. The low quality and poor prospects for advancement of many other jobs will make them unacceptable to many of the adults who want to work.

Neither the amount of available workers nor the amount of education or experience they possess offers assurance of meeting the human capital requirements of economic development in an age of structural transition. The quality of the worker—in terms of function, fit, and flexibility—is becoming most employers' major concern.

On the other hand, the overall quality of the work and the working environment will be the key determinant of worker frustration. To workers of the baby-boom generation, the "jobs" issue is not merely a matter of the number of openings, but is a constellation of needs—challenge,

independence, pay, location, mobility, status, and opportunity for growth.

In the absence of a productive learning enterprise, human capital inadequacies—the four Fs—will be a brake on all forms of economic development in the emerging knowledge economy.

Gaps in Employer Policies

The policies that have the most immediate impact on human capital are not those promulgated through government statutes and regulations, but are the policies employers establish to manage their organizations. In relation to our national human capital crisis, many employer policies are as deficient as government policies.

The Passing of Taylorism

The outworn philosophy of "scientific management" developed in the late 19th century by Frederick Winslow Taylor continues to dominate the management policies of American employers. Taylorism established a strict division between management and labor and reduced human capital to a fungible factor of production. Workers became the scientifically manipulated pawns in the industrial chess game played by management. In the Taylor scheme, the cardinal virtue of the worker was obedience, induced by the promise of growing wages and disciplined by the threat of unemployment.

The Taylor paradigm was well-intentioned and generally productive in an industrial age of mass production and standardization. But Taylorism has become obsolete in the postindustrial era, for several reasons.

First, the boundaries between worker, manager, and owner are increasingly blurred. Workers are becoming major owners of American business, either indirectly through what Peter Drucker has dubbed "pension-fund socialism" or directly through employee stock ownership plans (ESOPs). And foreign competition has induced a growing number of firms to embrace the principle of participatory management.

Second, the massive entry of women into the work force is transforming the nature of workers and work, and of managers and management. The traditional model of the husband as the sole breadwinner now applies to only about a quarter of American families. Not only are 53 percent of all women in the labor force, but the majority of married women are now in the labor force.

"Women-owned businesses are the fastest-growing segment of small business," says Juanita Weaver of the Small Business Administration. From 1972 to 1982, the number of self-employed women increased 69 percent, compared to 13 percent for men. By 1980, the 2.8 million women-owned sole proprietorships were over a fifth of such businesses, were increasing their number by 7 percent a year, and had annual sales of over $40 billion.[7]

The identity, needs, demands, and expectations of workers and managers are being radically changed by the growing impact of working women. Single or two-income parents need day-care for their children. The member of a two-income household is less threatened by unemployment and less willing to transfer, but wants "flextime" and "cafeteria" benefits. Women owners and managers challenge the role models of both female and male employees. Recent court decisions concerning the "comparable worth" of female-dominated occupations threaten an upheaval in compensation policies. And so on.

Third, a study by Daniel Yankelovich and John Immerwahr concludes that the growth of discretionary effort in the American workplace is a major cause of torpid productivity and requires a fundamental shift in management philosophy. There is a growing gap between the high level of intensity and quality of work required to achieve "excellence," and the minimum level that suffices for the individual to avoid being fired or penalized.

Probing for the source of this "commitment gap," Yankelovich and Immerwahr found that three-quarters of American workers say that they could be significantly more effective on their jobs than they are now. The reason they are not more effective is that only 13 percent of the work force believes that working harder or better would benefit them personally. Three-fourths of all workers agree

that management does not know how to motivate workers today.[76]

And fourth, rapid technological change demands a work force that is flexible, innovative, and entrepreneurial. In many businesses, product life cycles that once were measured in years or even decades have shrunk to months or even weeks. Rapidly changing products and services require employees—both workers and managers—who can exercise discretion and creativity, and quickly adapt their knowledge and skill.

As more workers rely on computers and other advanced technology in performing their work, the whole ethos of work and management will be forced to change. A study at Columbia University shows that "computer people" have needs and motivations quite different from those of workers in traditional jobs: They are informal in dress, indifferent to "perks" and promotions, and comparatively unconcerned about money, but are motivated by the quality of the work itself and are insistent on the opportunity to continue to develop their technical expertise. For these people, work and learning are inseparable.

Learning for a New Paradigm

The rise of the learning enterprise is part of this broad paradigm shift in the management of American organizations.

In the age of Taylorism, training was mostly equivalent to programming the human worker for the robotlike performance of simplistic and repetitive tasks. In the course of the industrial age, schools increasingly took on the characteristics of the factory, stressing specialization, analysis, measurement, and regimentation.

Now, in the postindustrial era, robots do robotic work. They can be trained and retrained at the push of a button to perform those routine tasks that require no discretion, no judgment, no creativity. We no longer need education and training institutions to "produce" standardized, reliable, predictable workers.

The extraordinary success of Peters and Waterman's *In Search of Excellence* (Harper and Row, 1982) demonstrates the force of the winds of change blowing through

American management. The best organizations in our economy do not treat their employees as tools of production but as partners in a shared venture in which the complete development of the person is recognized as a key factor of success.

Revising corporate cultures—whether in business, government, or nonprofit organizations—requires extensive new learning by managers and workers at all levels. The culture of collaboration, creativity, and individual initiative that many organizations are now pursuing in search of excellence can only be attained through a learning enterprise built on those same values.

The Confused Social Contract

Underlying the array of policy gaps described above is a fundamental confusion about the appropriate distribution of costs, benefits, and responsibilities for adult learning.

Our social commitment to the education of children is almost universally accepted, and, despite occasional arguments about the adequacy of our efforts, the responsibilities of parents, teachers, taxpayers, and churches to support childhood learning are broadly recognized. But we lack a comparable social contract to meet the learning needs of adults.

Employers invest tens of billions of dollars in training employees. But a quarter or more of this expenditure is estimated to go mainly to remedy the deficiencies in workers' basic skills that employers often feel are the responsibility of public education.

Employers also are often irked to see a worker they have invested in training then leave to work for someone else. For example, the $30,000-a-year cost of the Wharton Executive MBA program is paid in most cases by the student's employer; yet over 40 percent of the graduates take a job with another employer within two years of graduating.[77]

American workers invest billions of dollars worth of their own money and time in postsecondary education and training of various kinds. But if the expected economic benefits fail to materialize, workers often blame

government and or industry for not providing accurate career guidance or adequate financial aid and job-placement assistance.

Saying that government has some responsibility in this area leaves unresolved the key questions of what specific services government is supposed to perform, for whom, and who is supposed to pay the cost.

The protectionist character of most of our public and private policies concerning human capital may reflect our essential ambivalence about the ownership of human capital. Uncertain of our ability to control and profit from the intrinsic knowledge, skill, and experience that constitute each individual's human capital, we seek the illusory security of tenure in an extrinsic "job." We mortgage our selves to our titles.

Slavery, indentured servitude, and some traditional laws that treated women as virtual chattels settled many questions of human capital ownership with brutal clarity. The liberal laws that succeeded these unjust institutions are more humane, but nevertheless are complex and vague in their treatment of human capital ownership; for example:

- In the divorce case of *Sullivan vs. Sullivan* in the state of California, a woman who had supported her ex-husband through medical school demanded a share of all the expected income he would earn as a doctor—thus claiming that his medical degree was part of community property.
- Some government financial aid programs for medical and dental students require several years of postgraduate service as reimbursement; such a lien on human capital is difficult to collect. For example, the National Health Service Corps provides scholarships to educate health professionals in return for an obligation to serve at least two years in areas (usually rural) lacking primary medical services. But over half of the scholarship recipients never fufill the service obligation—30 percent pay the government back for their training while another 23 percent simply default, returning neither money nor service for their free education.[78]
- In the knowledge sector of the economy, the boundary between human capital and intellectual property is a

twilight zone that is increasingly a combat zone. A prominent physicist at the California Institute of Technology (Caltech) resigned when the Institute claimed ownership of a valuable computer program he had developed on his own time. When three IBM engineers who had helped develop the PC left the company to produce competing products they were charged with stealing trade secrets, that is, the proprietary knowledge they had gained in the course of their work.

Human capital starts with a basic genetic endowment and is then increased by the product of knowledge, skills, and experiences. But who owns it? More particularly, what equity interest is conferred by the investment in human capital? What are the proper measures of the return on that investment? What is the appropriate distribution of the profit or loss from human capital investments? The growth of the learning enterprise and its value to the economy will be hampered until we have better and more universally acknowledged answers to such questions.

CHAPTER 4

Needs

Stereotypes and Misconceptions

BEYOND THE ARRAY OF DEFICIENCIES in public and private policies bearing on human capital development, the learning enterprise is handicapped by obsolete beliefs and attitudes about adult learning. Many leaders in government and industry, as well as the American public as a whole, harbor images of "adult education" that bear little resemblance to the needs and opportunities for adult learning in the emerging knowledge economy.

First, our conventional concepts of *functional literacy* and *basic skills* are based on judgments about the skills an individual needs to function effectively—as a worker, consumer, and citizen—in a society of the past. Some of these skills may be obsolete, while others needed in the economy of the future are not yet being tested. For example, as videotex becomes the major medium of financial transactions, balancing a checkbook may be a less important skill than knowing how to interact with a televised display—"Pac-Man" may be more relevant to tomorrow's functional literacy than some high school math courses.

Entry level may no longer be a useful concept in describing workers or jobs. The aging of the baby-boom generation and the steadily growing role of women in the work force mean that many people entering a particular line of work will be mature adults with considerable skill and experience—men and women shifting careers or reentering the labor market after taking time out for child rearing or education—rather than teenagers looking for their first real job.

In many people's minds, the terms *adult education*, *vocational education*, and *training* or *retraining* evoke an image of something either recreational or remedial, either economically irrelevant or affecting only the poorest and most disadvantaged members of the work force.

Actually, between 40 percent and 80 percent of the adult population is estimated to be actively participating in organized learning at any given time.[79] (The wide range of the estimates is symptomatic of the poor data available about adult learning.) And the most common single reason adults give for participating in education and training is to advance in the work world.[80]

The Institutional Bias

Still another obstructive bias is the widespread tendency to identify education and training with formal institutions. Actually, the American Society for Training and Development estimates that U.S. corporations spend about as much on employee training each year as the total amount of tuition and fees paid to all of America's colleges and universities.[81] This estimate does not account for the informal but critical on-the-job training whose dollar value may be two to five times greater than that of the formal training companies provide.

Altogether, it is evident that postsecondary educational institutions account for only a minor portion of the investment in economically relevant adult learning. According to an estimate by Alan P. Wagner, schools accounted for 44.6 percent of job-related adult education expenditures in 1980, while nonschool providers (businesses, unions, military, government programs, etc.) accounted for 55.3 percent.[82]

Another study by the Educational Testing Service estimated that, of 64 million adult participants in deliberate learning in an organizational setting, roughly 72 percent were learning through nonschool organizations compared to only 28 percent enrolled in schools and colleges.[83] Research by Allen Tough of the Ontario Institute for Studies in Education suggests that the great majority of adult learning is self-directed and informal; 79 percent to 98 percent of the adult population is estimated to participate in such learning.[84]

The Youth Bias

Furthermore, there is a clear bias in most educational institutions against adults and in favor of youth.

Paul Barton, president of the National Institute for Work and Learning, writes:

> The largest impediment to equal service in higher education for adult workers is plain prejudice—prejudice against the adult learner. . . . We have not yet achieved a system of adult education. Thus far, we have merely tinkered with youth-serving institutions. . . . There needs to be a new understanding of adult learning defined not simply in contrast to the old traditions.[85]

Lack of Information

In addition to misleading stereotypes and misconceptions about adult learning and the wide gaps in existing public policies, a major barrier to creating the kind of learning enterprise needed by the new economy is an appalling lack of timely and accurate information about the entire system of adult learning in the United States. We need more information about:

- the demands for adult learning by both individuals and employers;
- the needs for learning in terms of changing occupational requirements and opportunities;
- the state of the art and projected trends in learning technologies; and
- the shape of the market, in terms of the suppliers of learning products and services.

Not only are there deficits of information in all of these categories, but there is a total lack of integration of the information that does exist to provide a comprehensive map—the proverbial "big picture"—of the learning enterprise as an industry.

Although the federal government has gathered enormous volumes of data about elementary and secondary education, information about formal higher and adult education is far more sparse, and useful data about training and other nonformal, noninstitutional adult learning processes are nearly nonexistent.

In the area of formal education, the principal information resource is the National Center for Education Statis-

tics (NCES). But, as Paul Barton points out, this resource is inadequate:

> The NCES data are limited in several respects. Only school-based instruction is measured. Only individuals over the compulsory school age of 16 are counted, although our popular definition of youth extends to age 18 or 21. Furthermore, restricting adult education to part-time attendance ignores the worker who goes to school full-time before going back to work. Moreover, the data measure *education* rather than *learning* in the broad sense.[86]

Not only is the scope of federal education statistics inadequate, but the quality of the available data is sometimes dubious. For example, the Vocational Education Data System (VEDS), which cost about $200 million over the past seven years, produced the following "facts":

- more than 29,000 Indians are enrolled in vocational education courses in Virginia (the total Indian population of the state is only 9,000);
- in New Jersey, 741,000 students took high school vocational education courses in 1979 (the number exceeds the state's total high school enrollment by 50 percent);
- in some states there are large numbers of vocational education students, but no teachers.[87]

On the paucity of useful national information about the vast enterprise of private training, Paul Barton, again, comments:

> . . . We know almost nothing about the dollar volume of private training investment. . . . Corporate and union headquarters do not have the data on which to base future training decisions either, or at least none are in evidence. Even firms committed to training do not have complete records on how much is performed, how much it costs, who gets it, and with what results. . . . An executive facing decisions about how much to spend on training has practically nothing to go on in making judgments about alternative investments.[88]

The available information about training often is extremely dated. The primary source of information on in-

dustrial training, based on a survey of workers themselves, is a Department of Labor study done in 1963.[89] The latest comprehensive survey of the training practices of large employers, done by the Conference Board, is 10 years old.[90]

Learning Technology

Up-to-date information on learning technology is even harder to come by. The best information about this technology is compiled by private market-research firms; but it is not necessarily structured around learning as a market category, it is mostly unpublished, and it is not commonly used by public policymakers.

The comprehensive survey of instructional technology by OTA is two years old, and drew on information sources several years older. In this explosive field, three years is almost ancient history. Two and a half years ago, there were fewer than a dozen software packages available for the then-new IBM PC; now there are over 10,000. Then, the home computer was a novelty; by 1985, as many as 20 million American homes will have computers.

The most serious shortage of information on learning technology may be not simply of published data but of basic knowledge. The available information suggests that the nation is not making an adequate effort in the R&D of learning technology. The OTA study found that "to make the most effective use of technology, there was a need for R&D in learning strategies and cognitive development, methods for the production of effective and economical curricular software, and the long-term psychological and cognitive impacts of technology-based education."[91]

In the federal government, the DOD now provides the bulk of R&D support in the field of learning technology. Civilian agency funding for R&D in learning technology, the majority of which comes from the Department of Education, has fallen precipitously from a temporary short-term peak in the late 1960s.[92]

Job Surveillance

Another area in which a deficit of accessible information poses an obstacle to the learning enterprise is the job

market. The diverse programs and proposals for training/retraining—from JTPA to Pat Choate's ITA—founder on the inability of the individual worker-student to link learning to earning, that is, to build a bridge between education or training and real employment opportunities.

The principal public agency devoted to serving this need, the Employment Service, "has gained the reputation in many quarters since the mid-60s of being a labor exchange for the lowest-paid and the highest-turnover jobs. . . . Actually, 38 percent of the new permanent job orders listed with the Employment Service are designated as low-skill, low-status occupations by the Department of Labor."[53] What we need, instead, says Lawrence Vickery of General Motors, is "some kind of surveillance system that shows jobs that do exist, where they exist and when are (others) going to be available."[54]

To be fully effective, the learning enterprise must be able to provide the consumer—both the employer and the individual worker—with sufficient information to know:

- What are the learning requirements of not only existing but future occupations?
- What is the competitive environment for a particular occupation (that is, how many and what kind of people are pursuing the same career path)?
- What learning products, technologies, and services are available?
- What is the expected return on specific investments in training and education?
- What and where are the real opportunities for employment?

The same kind of information is critical to the suppliers of products and services for the adult learning market to develop their business plans, to attract investment, and to meet customers' demands. This information does not now exist in a form that can be used by the consumers and suppliers who need it.

Limited Resources

Finally, any practical solutions to the problems of human capital, adult learning, and economic development—

the problems of the four Fs—must recognize the constraints of an era of limits. The U.S. government is faced with ballooning deficits and is in no condition to take on massive new fiscal burdens. American industry, hectored by ever more intense foreign competition, has made productivity and efficiency its new watchwords. These trends have led to new, more pragmatic thrusts in policy thinking:

- an interest in containing the growth of government, in deregulating several industries, and in privatizing some public services;
- a concern for increasing the efficiency and productivity of both public and private enterprises;
- a desire to reduce dependency and to increase local and individual self-reliance;
- a broad sentiment in favor of partnership, both among government entities (for example, the Reagan administration's New Federalism Initiative) and between public and private institutions;
- a movement toward entrepreneurial management in both private and public organizations;
- a popular antipathy for bureaucracy and "red tape"; and
- a fascination with high-technology tools—computers, telecommunications, robotics, and so forth.

The concept of the learning enterprise itself is a way of accommodating solutions of the human capital crisis to the reality of limited resources by emphasizing technological innovation, productivity, private initiative, competition, entrepreneurship, and a primary focus on the needs of the learning consumer.

America is now spending $100 billion to $200 billion or even more each year on adult learning of various kinds. DOD spends about $18 billion a year on formal training and education; a large portion of the total defense budget represents the cost of on-going military training.

There is no shortage of total resources available for adult learning. Resolving our human capital crisis does not necessarily require more resources. Rather, the resources already invested in learning need to be allocated more efficiently, more effectively, and in some cases more equitably.

What Must Be Done

An economy undergoing irresistible structural transformation contains the threat of severe human capital crisis and painful social upheaval. A national effort is needed to crystallize public awareness and concern and to mobilize support for action to transform this crisis into an opportunity. With the cooperation of business, government, nonprofit organizations, associations, and others, the learning enterprise must and can become the backbone industry of a new, fourth sector of the modern economy.

In general, we must work to attack the barriers described above: remedy gaps and deficiencies in existing policies; educate the public to overcome popular misconceptions about the increasingly critical role of adult learning in economic development; develop better information about all key aspects of the emerging learning enterprise; and find solutions that make minimal demands on limited public and private resources.

Of these, the first objective should be to develop better information about the learning enterprise in a form that provides a comprehensive map—the *big picture*—of the adult learning system, including supply and demand, public and private, formal and nonformal, proprietary and nonprofit, institutional and individual, traditional and emerging elements. This mapping of the system is urgently needed by:

- existing and prospective suppliers who need to know more about the needs, demands, and technologies of learning markets;
- consumers who need better information about the options available to meet learning needs; and
- public and private policymakers, as a basis for devising policies that remove barriers and provide low-cost, efficient stimulation to the growth of the learning enterprise.

Of course, gathering more information about the learning enterprise will not, alone, provide sufficient impetus for change. A detailed plan of action demands more rigorous research and analysis than this exploratory study has been able to provide. But the following options for action are at least worth thinking about.

Reduce emphasis on academic degrees. There is no job in this economy that requires an academic degree for its effective performance. Demanding academic credentials as a condition of employment only serves as a barrier to competition, both in the job market and in the learning market. Fortunately, the trend in recent years has been for more employers to include the phrase "or equivalent" when mentioning degree requirements in their job requisitions. The result of the proliferation of degree granting and the decline of academic standards is that a diploma, even from an allegedly "top" institution, by itself tells an employer next to nothing about individual competence.

Focus on evaluation of competency and achievement. The efficiency of the learning market depends on the ability of the consumer—whether individual or employer—to measure the value of the products and services offered by vendors. What needs to be measured is the competence and achievement resulting from learning. Evaluations administered by vendors themselves are inevitably handicapped by a conflict of interest. We need more and better independent testing and evaluation services—such as the Educational Testing Service—to assess the productivity and competitiveness of the learning process.

Expand R&D and technology transfer. A larger and more focused investment is warranted in basic R&D in cognitive science and learning technology. Much of the research now going on in artificial intelligence and related domains of computer science is relevant to learning but needs to be applied more explicitly to human learning needs. Much research is focused on childhood learning and development; adult learning and development is qualitatively different and demands at least an equal investment of research effort.

DOD is the major source of support for research in artificial intelligence and advanced computer technology; DOD also is the major developer and user of learning technology. Although some will debate whether DOD should be the focal point for this work, the important need is to transfer DOD's technical knowledge and resources for adult learning to the civilian learning industry. To its credit, the department has been actively supporting such transfer. What may be needed is a complementary effort

from outside of DOD—a collaborative venture of learning providers, consumers, associations, etc.—to identify what DOD has to offer and to accelerate its dissemination in the civilian economy.

Develop human capital investment advisory services. To the extent that we have better intelligence about future demands for human capital, our investments in human capital development are likely to be more productive. Current job forecasts clearly do not adequately account for technological and other environmental changes. Actually, predicting future jobs is almost impossible, and is not particularly relevant to human capital investment decisions. What would be somewhat easier, and more useful, is to identify how specific areas of knowledge and skill compare in terms of expected benefits and risks. The need is not so much for better official forecasts as it is for a more robust supply of advisory services.

People who are buying real estate or investing in stock find an enormous social infrastructure—brokers, lawyers, accountants, books, newsletters, seminars, financial institutions, government regulators, consumer groups—ready and eager to help them get a rewarding return on that kind of investment. By contrast, the sources we can turn to for advice on an investment in our personal human capital are less abundant and less sophisticated. With over $100 billion (perhaps over $200 billion) being spent annually in the U.S. on adult learning, developing advisory services for human capital investors (100 million or more people) would seem to be a golden opportunity for entrepreneurs.

Focus telematics industry products and services on the adult learning market. A number of companies in telecommunications, computers, and software have begun to pursue education as an attractive market. But many of these new entrants to the learning industry have been concentrating on products and services for children rather than for adults. The adult market is actually a larger and more lucrative one for new venturers in the learning enterprise.

Though the amount of money devoted to elementary/secondary education seems large, most of it is tied up in institutions—particularly for buildings and salaries—and

is not available for discretionary purchases from private vendors. There are only a few thousand schools in the country, and selling to them is difficult.

The adult learning market is over $100 billion a year. The majority of the market is non-institutional. For the most part, adult learning is purchased by the consumer (in contrast to childhood education, which is purchased by someone else on behalf of the consumer.) The demand for adult learning products and services is substantial, it is here now, and it is growing as the baby boomers age, as career transitions become more frequent, and as the distribution of employment in the economy shifts toward knowledge work and training-intensive industries.

Revise the financing of human capital. Within the generally confused social contract concerning human capital, the area most urgently demanding attention is finance. We need to rethink the means for financing human capital development and the resulting distribution of benefits, costs, and obligations. U.S. tax laws already favor physical capital over human capital development; a tax bill recently passed by Congress would further reduce the incentives for investment in training and education. Although Pat Choate's ITA proposal may not be perfect, among its most commendable features is the linkage of savings to human capital investment. This is an important shift away from entitlements and borrowing as major mechanisms for financing adult training and education. The overall problem is complex, and deserves the serious attention of public and private policy analysts.

Rethink. This exploratory study necessarily raises more questions than it answers. Its immediate goal is to provoke serious reexamination of the critical role of adult learning in a changing economy.

Government leaders need to rethink many of their existing policies concerning education, training, economic development, and human capital. States in particular are likely to find literally dozens of state policies having an impact on adult learning—accrediting and operating institutions, licensing professions, providing financial aid, administering tests, and so forth. This reexamination should focus on finding ways to accelerate the maturation of the adult learning market, and to increase competition.

Managers, workers, and owners in both private and public organizations need to rethink the social contract surrounding the human capital they employ.

Finally, people in the myriad businesses that constitute the learning industry need to adopt a broad vision of their economic role, and must take the lead in building the learning enterprise our whole society so urgently requires.

The learning enterprise is not a panacea for all the ills of an economy in transition. But it is an essential lubricant for the wheels of change. The good news is that the same telematic technology that is causing economic upheaval can energize the learning process that the transformation demands. In the words of the philosopher Pogo, we seem to be confronted with an "insurmountable opportunity."

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THE LEARNING ENTERPRISE

Adult Learning, Human Capital and Economic Development

Lewis J. Perelman

The need for investment in a nation's human capital base through recurrent education of adults in addition to the historical investment in new labor market entrants (youth) is now a recognized component of public policy in most advanced nations. In the U.S. states have historically had major responsibility for postsecondary education and are now about to relinquish that prerogative. Hence the CSPA's advocacy for this issue is both timely and appropriate—state government action and investment may well prove the key to national economic success and social stability.

Dr. George J. Nolfi
Senior Management Analyst
Education & Training
Office of the Secretary of Defense

Perelman's argument is right on target: the adult learning sector of the economy deserves far more attention than it has received. *The Learning Enterprise* offers a unique and timely vision of the whole of the adult learning system, of the barriers as well as the opportunities, and of the needs of both individuals and the economy as a whole.

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